

Obesity represents a predominant risk factor for the development of metabolic diseases like type 2 diabetes mellitus and it is characterized by adipocyte hypertrophy. The size of adipocytes influences the adipocytes biology and secretory functions of adipose tissue in general. Understanding the mechanisms regulating growth and secretory activity of adipose tissue is of paramount importance. Moreover, obesity represents a chronic subclinical inflammatory state linking obesity to insulin resistance and hypertrophic adipocytes contribute to this phenomenon. An improvement of strategies used in the prevention and treatment of inflammation associated with obesity is therefore urgently needed.

The four studies described in this thesis address several topics related to adipose tissue biology, and thus contributing to the understanding of the integrating role of adipose tissue secretory functions in response to dietary and pharmacological treatments. This thesis demonstrates a possible role of white adipose tissue thyroid hormones (TH) metabolism in the modulation of its function under conditions of changing adiposity (Publication A); a unique role of leptin, secreted from adipose tissue, in the complex control of energy homeostasis of the organism (Publication B); beneficial effects of the combination treatment of eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA) and rosiglitazone (Publication C); and beneficial effects of the chemical DHA derivatives (Publication D).

Results of all presented studies support the concept of an integrating role of adipose tissue secretory functions in the whole-body responses to dietary constituents as well as to pharmacological agents, which ameliorate obesity and associated insulin resistance.